UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/686,115	10/11/2000	Charu C. Aggarwal	YOR920000429US1	4940

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William E. Lewis
Ryan, Mason & Lewis, LLP
90 Forest Avenue
Locust Valley, NY   11560

EXAMINER
BOOKER, KELVIN E

ART UNIT	PAPER NUMBER
2121	5

DATE MAILED: 09/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 07-01)

	Application No.	**Applicant(s)**	
Office Action Summary	09/686,115	AGGARWAL ET AL.	
	Examiner	**Art Unit**	
	Kelvin E Booker	2121	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☐ Responsive to communication(s) filed on _____ .

2a) ☐ This action is **FINAL.**   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-30* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-3,6-13,16-23 and 26-30* is/are rejected.

7) ☒ Claim(s) *4,5,14,15,24 and 25* is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

    If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All b) ☐ Some * c) ☐ None of:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

    a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>5</u> .

4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☒ Other: *Detailed Office Action* .

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this
> or a foreign country, before the invention thereof by the applicant for a patent.

2. **Claims 1-3, 6-9, 11-13, 16-19, 21-23 and 26-29** are rejected under 35 U.S.C. 102(a) as being

anticipated by Knorr et al., "Distance-Based Outliers: Algorithms and Applications" [hereafter

Knorr].

As per claim 1, Knorr teaches of a method of detecting one or more outliers in a data set,

comprising the steps of:

A. determining one or more sets of dimensions and corresponding ranges in the data set

which are sparse in density (see the *Abstract*; and section *3.1: Index-based algorithms*, especially

paragraphs one and two: "Let N be...as an outlier"); and

B. determining one or more data points in the data set which contain these sets of

dimensions and corresponding ranges, the one or more data points being identified as the one or

more outliers in the data set (see section *3.1: Index-based algorithms*, especially paragraph two:

"From the formulation...as an outlier").

As per claim 2, Knorr teaches of a method wherein a range is defined as a set of

contiguous values on a given dimension (see section *3.1: Index-based algorithms*, especially

paragraphs one and two; and section *4.4:Generalization to higher dimensions*, especially

paragraph one: "When moving from...Properties 1 and 2").

As per claim 3, Knorr teaches of a method wherein the sets of dimensions and

corresponding ranges in which the data is sparse in density is quantified by a sparsity coefficient

measure (see section *4.4:Generalization to higher dimensions*, especially paragraph two:

"However to preserve...kD cell structure").

As per claim 6, Knorr teaches of a method wherein a set of dimensions is determined

using an algorithm which uses the processes of solution recombination, selection and mutation

over a population of multiple solutions (see section *3.1: Index-based algorithms*, especially

paragraph three: determining outliers with regards to multiple dimensions).

As per claim 7, Knorr teaches of a method wherein the process of solution

recombination comprises combining characteristics of two solutions in order to create two new

solutions (see section *3.2: A nested-loop algorithm*, especially paragraph one: "To avoid the

cost...D-neighbors exceeds M").

As per claim 8, Knorr teaches of a method wherein the process of mutation comprises

changing a particular characteristic of a solution in order to result in a new solution (see *4.4:*

Generalization to higher dimensions, especially paragraph two: "However to preserve...kD cell

structure").

As per claim 9, Knorr teaches of a method wherein the process of selection comprises

biasing the population in order to favor solutions which are more optimum (see *4.4:*

Generalization to higher dimensions, especially paragraph two: "However to preserve...kD cell

structure").

As per claims 11-13 and 16-19, the same limitations are subjected to in claims 1-3 and 6-10, respectively, therefore the same rejections apply (see claims 1-3 and 6-10 above).

As per claims 21-23 and 26-29, the same limitations are subjected to in claims 1-3 and 6-10, respectively, therefore the same rejections apply (see claims 1-3 and 6-10 above).

3. **Claims 10, 20 and 30** are rejected under 35 U.S.C. 102(a) as being anticipated by Sheikholeslami et al., "WaveCluster: a wavelet-based clustering approach for spatial data in very large databases" [hereafter Sheikholeslami].

As per claim 10, Sheikholeslami teaches of a method of detecting one or more outliers in a data set, comprising the steps of:

A. identifying and mining one or more patterns in the data set which have abnormally low presence not due to randomness (see section 1: *Introduction*, especially page 289, paragraph three: "The aim of data-clustering...during the mining process); and

B. identifying one or more records which have the one or more patterns present in them as the one or more outliers (see section 6: Performance Evaluation, especially page 299, section *Handling noise objects*: "WaveClustering is very effective...the one without noise").

As per claims 20 and 30, the same limitations are subjected to in claim 10, therefore the same rejections apply (see claim 10 above).

Allowable Subject Matter

4. **Claims 4, 5, 14, 15, 24 and 25** are objected to as being dependent upon a rejected base

claim, but would be allowable if rewritten in independent form including all of the limitations of

the base claim and any intervening claims.

5. The following is a statement of reasons for the indication of allowable subject matter:

the cited prior art fails to explicitly teach of a method and means for detecting one or

more outliers in a data set inclusive of the limitations of claims 1 and 3 [respective of claims 4

and 5 above], claims 11 and 13 [respective of claims 14 and 15 above] and claims 21 and 23

[respective of claims 24 and 25 above] consistent with the limitations of the aforementioned

claims 4, 5, 14, 15, 24 and 25, wherein the sparsity coefficient measure (S(D)) is defined as

$[(n(D)-(N*f^k))/(N*f^k*(1-f^k))^{1/2}]$, whereby S(D) is inversely proportional to the number of data

points in a given set of dimensions and corresponding ranges.

Conclusion

6. The following is prior art made of record and not relied upon is considered pertinent to

applicant's disclosure:

      A. Lodder, U.S. Patent No. 5,121,338;

      B. Bickel, U.S. Patent No. 5,263,120;

      C. Zhang et al., U.S. Patent No. 5,832,182;

      D. Zhang et al., U.S. Patent Application Publication No. 2002/0165837;

      E. Agrawal et al., U.S. Patent No. 6,003,029;

F. Guha et al., U.S. Patent No. 6,092,072;

G. Fayyad et al., U.S. Patent No. 6,115,708;

H. Nguyen et al., U.S. Patent No. 6,336,082;

I. Agrafiotis et al., U.S. Patent No. 6,571,227;

J. Guha et al., "CURE: An Efficient Clustering Algorithm for Large Databases";

K. Knorr et al., "A Unified Approach for Mining Outliers";

L. Becker et al., "The Maximum Asymptotic Bias of Outlier Identifiers";

M. Srikant et al., "Research Report: Mining Sequential Patterns: Generalizations and

Performance Improvements";

N. Nasraoui et al., "A Robust Estimator Based on Density and Scale Optimization and its

Application to Clustering";

O. Maiyuran et al., "A Cluster Based Approach to Robust Regression and Outlier

Detection".

P. Shanmugasundaram et al., "Compressed Data Cubes for OLAP Aggregate Query

Approximation on Continuous Dimensions";

Q. Palpanas, T., "Knowledge Discovery in Data Warehouses";

R. Kunz et al., "Fast Detection of Communication Patterns in Distributed Executions";

S. Aggarwal et al., "On the Merits of Building Categorization Systems by Supervised

Clustering"; and

T. Jain et al., "Data Clustering: A Review".

7. An inquiry concerning this communication or earlier communications from the examiner

should be directed to Kelvin Booker whose telephone number is (703) 308-4088. The examiner

can normally be reached on Monday-Friday from 7:00 AM-5:30 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Anil Khatri, can be reached on (703) 305-0282. The fax number for the organization

where this application or proceeding is assigned is (703) 746-7239.

An inquiry of a general nature or relating to the status of this application proceeding

should be directed to the receptionist whose telephone number is (703) 305-3900.

K.E.B.

Art Unit 2121

September 11, 2003

Wilbert L. Starks, Jr.
Primary Examiner
Art Unit - 2121